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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
DN A01504

In re application of: Y. Kashimura, et. al.

Serial No.: 10/810,017 : Group Art Unit: 1616

Filed: 03/26/04 : Examiner: S. N. Qazi

For: Technique for Effectively Treating an Agricultural Product with a 1-Substituted Cyclopropene

Mail Stop Amendment  
Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

RESPONSE

This is in response to the Office Action dated April 7, 2007 for the above-identified application.

REMARKS

Claims 1 to 5 are pending in the Application. Claims 1-5 are rejected. Reconsideration and withdrawal of the rejection of record is requested in view of the following comments:

Rejection under 35 USC §112, first paragraph

Claims 1-5 are rejected under 35 USC §112, first paragraph as failing to comply with the written description requirement in that the R group in claim 1 represents various substituents but only the compound 1-methylcyclopropene ("1-MCP") was exemplified for the disclosed treatments.

Applicants' invention is a method of use involving the treatment of an agricultural product with a substituted cyclopropene under reduced pressure. The cyclopropene compounds claimed in the method are all known compounds. See, for example, US Patents 6,444,619 (col. 2, lines 8-40; previously cited by the Examiner), 6,426,319 (col. 2, lines 20-52) and 6,762,153 (col. 2, lines 33-65; also previously cited by the Examiner). These known cyclopropene

compounds have the same mode of action in that they suppress the deterioration of agricultural products with which they come into contact. Applicants' discovered that by contacting such compounds with agricultural products under reduced pressure, the efficacy of the compounds are improved over the effect at normal pressure (see the Specification, page 2, lines 13-18).

Applicants provided in their Specification working examples of the improved efficacy provided by the use of 1-MCP at reduced pressure. Applicants recognized that such a process would be applicable to a variety of known cyclopropene compounds because of their similarity of mode of action. Applicants' working examples certainly demonstrate reduction to practice of the invention. In addition, Applicants have shown that the invention was "ready for patenting" through their disclosure of the structural chemical formulas that show that the invention was complete and describing distinguishing identifying characteristics of the method of use sufficient to show that the Applicants were in possession of the claimed invention. The disclosure in the Specification of the scope of the cyclopropene compounds claimed along with the working examples would reasonably convey to one skilled in the art the manner and process of making and using the claimed invention. That is, using known compounds in a new way. Applicants respectfully request, therefore, that this rejection be withdrawn.

Rejection under 35 USC §103(a) - 1<sup>st</sup> Rejection

Claims 1-5 are rejected under 35 USC §103(a) as being unpatentable over Sisler (U.S. Patent No. 6,194,350) ("Sisler") and Huang, et. al, Chinese Soc. Hort. Sci., 49(1): 55-62, 2003 ("Huang") in view of Rossi (U.S. Patent No. 3,943,987) ("Rossi"). The Office Action states that Sisler teaches methods of applying to plants an effective ethylene response-inhibiting amount of cyclopropene derivatives in gaseous form, including methods of inhibiting abscission in plants and methods of prolonging the life of cut flowers; the abstract of Huang teaches that pretreatment of flowers with a mixture containing 1-MCP under low pressure resulted in prolongation of vase life of flowers; and Rossi teaches an airtight container for perishable articles which provides a partial vacuum for perishable foodstuffs.

The Office Action correctly points out that Sisler does not teach or suggest the use of 1-MCP under reduced pressure. All of the disclosure of Sisler teaches the use at normal pressures.

Contrary to what the Office Action states, Huang does not disclose, teach, or suggest pretreatment of flowers with 1-MCP at reduced pressure. The Huang abstract states:

"It was found that when flowers are treated prior to transport by the low-pressure fumigation method developed by the Bureau of Animal and Plant Health Inspection and Quarantine (e.g., fumigation for three hours at low pressure (250 torr) with a mixture of methyl bromide (10 g/m<sup>3</sup>) and phosphine (3 g/m<sup>3</sup>), adverse effects on quality and vase life following transport of Oncidium cut flowers were minor compared to those seen in high-dose fumigation with methyl bromide (24.5 g/m<sup>3</sup>), and these adverse effects could be effectively alleviated by pretreatment with 'TARI's Onc 1' and 1-MCP."

and

"The results clearly demonstrated that appropriate preservative treatment can alleviate damage caused by fumigation of Oncidium cut flowers after export to Japan, and that low pressure fumigation shows a favorable effect on insect mortality, and it is worth conducting further research on practical method of appropriate preservative treatment in order to further ensure cut flower quality"

The abstract does indicate that the insecticidal fumigations of the flowers were carried out under reduced pressure. The abstract does not indicate that the treatment with 1-MCP was carried out at reduced pressure. In fact, it clearly states that treatments with 1-MCP were pretreatments.

This is further confirmed by reading the entire reference. Page 4 of Huang, section number 2 discloses that the orchid flowers are first treated with 1-methylcyclopropene under ambient conditions and then fumigated at reduced pressure. (see translation provided in our previous responses page 4, lines 7-13). In most of the examples there is a simulated transportation step between the 1-MCP treatment and fumigation. Each of the disclosures in Tables 3, 4, 5, and page 12 of Huang refer only to the fact that low pressure fumigation is done with methyl bromide or phosphine. The general procedure in section 2 of Huang describes how the cut flowers are treated with TARI's Onc 1 and 1-MCP as a separate step from the low

pressure fumigation with methyl bromide or phosphine. There is no disclosure, teaching, or suggestion in Huang alone, or in combination with Sisler, that plants are, or should be, treated with 1-MCP at reduced pressures. Tables 3, 4, and 5, and page 12 of Huang do not teach the use of 1-MCP at reduced pressure, only that the separate step of fumigation was conducted at reduced pressure. Thus, the reference does not disclose Applicants' claimed invention; the treatment of plants and plant parts with 1-methylcyclopropene at reduced pressure, and the advantages of such treatment. The Office Action states that since the prior art teaches low pressure that it would have been obvious to use low pressure for the treatment with 1-MCP alone. However, this assumption misses the purpose of utilizing low pressure for fumigation. Huang indicates that fumigants themselves cause damage to the plants. (See page 11, lines 8-26, particularly lines 22-26). That is, the low pressure technique disclosed in Huang relates to materials which are phytotoxic to plants and is an effort to reduce such phytotoxicity. The sole purpose of the use of low pressure in the fumigation step is to reduce the dose of fumigant while still maintaining activity against the insect pests. (See page 12, lines 6-19). 1-MCP, on the other hand, does not damage plants. In fact, it is known to preserve plants. As a result, there is no motivation to use 1-MCP at a reduced dose as there is with using the fumigants. Rather, one would expect the opposite. That is, to use the 1-MCP at higher pressure to improve its effectiveness. Furthermore, it is clear from Huang that the fumigation and 1-MCP steps in the process are carried out entirely separately. If it was obvious to carry these steps out simultaneously, Huang would have done so in order to reduce the number of steps involved in the process. If anything, the Huang reference teaches away from the use of 1-MCP at low pressures.

Rossi merely describes a container for materials which allows for the evacuation of air after closing the container. The purpose is to protect whatever material is contained in the container, be they foodstuffs, chemicals, pharmaceuticals, or any other materials requiring an air-free environment (see the abstract). For foodstuffs, the purpose is to remove air which may destroy the freshness of the foodstuff (see col. 2, lines 40-48). There is no disclosure, teaching, or suggestion, either alone or in combination with Sisler and Huang, that such an apparatus would be useful to treat a foodstuff or an agricultural product with a gas such as, for example, 1-

MCP. The purpose of the Rossi invention is to remove a material (air) that is harmful to the contained material rather than to aid in contacting the contained material with a preservative.

Sisler teaches the advantages of 1-MCP. Huang teaches the advantages of fumigation with an insecticide at reduced pressure to avoid damage to plants by the insecticide. Rossi teaches that air trapped in a container may destroy the freshness of cakes or similar articles. None of these references alone or in combination teach Applicants' invention, which is the use of 1-MCP at reduced pressure. One skilled in the art would not, absent Applicants' disclosure, consider that the cited references would lead one to Applicants' claimed method of use.

The Office action states that in the absence of any criticality and/or unexpected results, the instant invention is considered obvious to one skilled in the art at the time of invention. However, Applicants' Examples clearly demonstrate the unexpected advantages of the reduced pressure treatment with 1-MCP over the standard treatment. One distinct advantage is in the significantly reduced treatment times.

Therefore, one of ordinary skill in the art at the time of the invention would not have found Applicants' invention obvious in light of Sisler, Huang, and Rossi.

#### Rejection under 35 USC §103(a) - 2<sup>nd</sup> Rejection

Claims 1-5 are rejected under 35 USC §103(a) as being unpatentable over Zanella, *Postharvest Biology and Technology* 27 (2003) 69-78 ("Zanella") and Huang. The Office action states that Zanella teaches that, at low-pressure, treatment with 1-MCP has better control of superficial scald and ripening and Huang teaches that pre-treatment of flowers with 1-MCP resulted in prolongation of vase life of flowers..

There are two issues related to this rejection. The first concerns the point in Zanella's process in which the 1-MCP treatment occurs. Zanella, page 71, Section 2. Material and methods describes the process as first treating the fruit with 1-MCP (Section 2, lines 4-13), then keeping the fruit at 2.5 °C and ~95% relative humidity for 7 days, then storing in either normal or controlled atmosphere conditions. There is no disclosure, teaching, or suggestion of treating the fruit with 1-MCP at reduced pressures. Both the abstract and the body of the reference teach the use of 1-MCP in combination with storage under controlled atmospheres with low oxygen concentration, not low pressure. (See second issue below.)

The second issue relates to controlled atmosphere storage itself. Controlled atmosphere storage is a well-known technique in which the temperature, oxygen, carbon dioxide, and humidity levels are carefully controlled in order to preserve the freshness of produce. The oxygen levels are typically reduced by displacement with nitrogen. References previously submitted in prior responses (Washington Apple Commission, especially paragraph 6; and Kupferman, *Controlled Atmosphere Storage of Apples and Pears*, Washington State University - Tree fruit Research and Extension Center, December 2001) each describe the effects and the use of controlled atmosphere storage conditions on fruits. These references teach that the percentages of oxygen and carbon dioxide content in the atmosphere are controlled, that is, their partial pressures, not the total pressure of the controlled atmosphere.

The Huang reference has been addressed in the first rejection, above. The same considerations apply to its use in combination with Zanella in the second rejection. One skilled in the art, therefore, would not have found Applicants' invention obvious in light of Zanella and Huang.

Again, Applicants refer to the unexpected advantages of the reduced pressure treatment with 1-MCP over the standard treatment that is found in the Examples in the Application.

With this response, Applicants believe that the rejections have been overcome and the claims are in condition for allowance. Should the Examiner have any suggestions which may put the Application in better condition for allowance, Applicants' attorney is willing to discuss any such suggestions either by phone or at the U. S. Patent and Trademark Office.

Respectfully submitted,

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